

2 parts

10/550988

JC09 Rec'd PCT/PTO 26 SEP 2009

- 1 -

# A FRICTION DEVICE FOR ROLLING UP CURTAINS AND THE LIKE

## BACKGROUND OF THE INVENTION

The present invention relates to production of rolling up  
5 curtains, aimed at being applied to windows and the like  
for darkening and/or protection and/or decoration.

## DESCRIPTION OF THE PRIOR ART

These curtains are usually rolled up on a substantially  
10 horizontal roller, supported, with possibility to rotate,  
inside a suitable case situated above the window.

The axial rotation of the roller makes the curtain unroll  
or roll up.

Usually, according to a widespread embodiment, the  
15 rolling up curtains are operated manually to unroll and  
to roll up.

For this purpose, a grooved pulley is situated at one end  
of the roller, on which the curtain is wound.

A driving chain engages with the groove made in the  
20 pulley.

The major disadvantage of the rolling up curtains results  
from the curtain extreme unbalancing, compensated for by  
the operator, during the unrolling and rolling up steps.

In fact, it can be easily understood that during the  
25 rolling up, it is necessary to pull the chain with a  
strength, in order to overcome the curtain weight force,  
while, during the unrolling, it is necessary to  
counterbalance the free dropping of the curtain, whose  
speed increases rapidly during unrolling, just to avoid  
30 too quick fall.

This disadvantage is particularly accentuated, when the curtain is relatively heavy and big.

According to another embodiment of prior art, the rolling up curtains have reinforcement means including elastic  
5 means, which are situated inside the roller, to which they are fastened, and which facilitate the curtain rolling up.

By acting directly on the curtain, the roll is made to rotate and consequently, the elastic means are twisted,  
10 so that the corresponding elastic reaction can be used for rolling up the curtain.

The elastic means are advantageously fastened at one end to the roller, and at the other end to the stationary support structure, so that the latter are stressed  
15 sufficiently to unroll the curtain.

In order to avoid any curling of the elastic means, they are usually fastened, at one end, to an element, which translate axially inside the roller and they are driven to rotate by the roller.

20 For example, the document EP 0.900.314 discloses improved elastic means, which supply a gradual elastic reaction during the curtain rolling up, including a plurality of helical springs, which are aimed at rolling up the curtain on a relative roller.

25 The helical springs are fastened to a common support, which is keyed onto a shaft, as well as to respective support and fastening elements, and which is shape-coupled to the above roller.

However, reinforcement means according to prior art,  
30 usually act as an additional contrast to the free drop of

the curtain during the unrolling step, but they cannot avoid a possible fall of the curtain.

#### SUMMARY OF THE INVENTION

- 5 The object of the present invention is to avoid the above mentioned disadvantages by proposing a friction device for rolling up curtains and the like, which allows best balancing thereof during their rolling up and unrolling, ensuring high stability in any intermediate position.
- 10 Another object of the present invention is to propose a friction device, which allows operation of the rolling up curtains by a substantially equilibrated action during the rolling up and unrolling, independently from the curtain type and dimensions.
- 15 A further object of the present invention is to propose a particularly functional and reliable friction device, which is obtained by a technical solution of extremely simple construction, and which is particularly noiseless during its operation.
- 20 A further object of the present invention is to propose a friction device, which allows a rapid and best adjustment of the curtains stop points, during rolling up as well as unrolling, and which is particularly simple and rapid to be assembled, and allows easy maintenance operations.
- 25 A still further object of the present invention is to propose a friction device which can be assembled in one block, and which can make easier the assembling, from which the complete curtain assembly is obtained.

The above mentioned objects are achieved by the features  
30 of the independent claim, according to which a friction device for rolling up curtains and the like, includes:

a tubular roller, on which a curtain is wound;

support means for rotatably supporting said roller;

a threaded stem supported inside said roller in a way as  
to create an angular displacement of said roller with  
5 respect to said threaded stem during rotation of said  
roller;

the device being characterized in that it further  
includes:

an operative body, situated slidably inside the roller  
10 and screw-fitted onto said stem, said operative body  
being linked to said roller in relation to rotation so as  
to move axially along said threaded stem during the  
rotation of the roller due to unrolling and rolling up of  
said curtain from a rolled up configuration to a unrolled  
15 configuration and vice-versa;

first elastic means and second elastic means acting on  
said operating body and in opposition to one another, so  
as to produce a variable friction effect on said  
operating body during motion of said curtain between said  
20 unrolled configuration and rolled up configuration, and  
vice-versa, such that the curtain can be driven in a  
substantially balanced way during rolling up and/or  
unrolling;

first stop means and second stop means fastened to said  
25 threaded stem, and aimed at pressing respectively said  
first elastic means and second elastic means, against  
corresponding first surface and second surface of said  
operating body.

Preferred features of the invention are then defined in  
30 the dependent claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- 5       - Figure 1 is a schematic, front view of a rolling up curtain, operated by a chain, in a rolled up configuration A;
- Figure 2 is a schematic, longitudinal section view of the roller, on which is rolled up the curtain in said rolled up configuration A;
- 10       - Figure 3 is a schematic, cross section view, taken along the plane III-III of the winding roller of Figure 2;
- Figure 4 is a schematic, front view of the rolling up curtain shown in Figure 1, in unrolled configuration B;
- 15       - Figure 5 is a schematic, longitudinal section view of the roller, on which is rolled up the curtain in said unrolled configuration B.

#### 20   BEST MODES OF CARRYING OUT THE INVENTION

With reference to the above figures, the general reference numeral 1 indicates a tubular roller, on which a curtain 1a winds, and which is rotatably supported about a horizontal axis by relative support means 10, made in a stationary fixed structure.

The roller 1 is driven into rotation by a driving chain 1b, which engages with a shaped matching groove of a pulley 17, situated beside the roller 1. By means of the pulley, the curtain can be moved between extreme

configurations, a rolled up configuration A and an unrolled configuration B (Figures 1, 4).

The proposed friction device, indicated as a whole with the general reference numeral 100, includes also a  
5 threaded stem 2, which is arranged axially inside the roller 1 and supported in a way as to create an angular displacement of the roller with respect to the threaded stem during rotation of the roller.

According to a preferred embodiment, the means 100  
10 support rotatably the roller 1 and the threaded stem 2 in a stationary condition.

An operative body 3 is mounted, sliding axially within the roller and screw-coupled onto the threaded stem 2.

The operative body 3 is preferably cylindrical and can  
15 translate axially with respect to the threaded stem 2, in that it has means for prismatic coupling with the roller 1, for example, a pair of teeth 30, made in diametrically opposite positions and guided in relative inner grooves made in the roller 1 (Figure 3).

Moreover, the friction device 100 includes elastic means,  
20 first 4 and second 5, acting on the cylindrical body 3, ones against the others, and having a friction effect on the roller 1, during the curtain 1 movement between the extreme configurations, the unrolled configuration B and  
25 rolled up configuration A, thus allowing operation of the curtain in a substantially balanced way during rolling up and/or unrolling steps.

Suitable stop means, first 40 and second 50, fastened to the threaded stem 2, are aimed at pressing the respective  
30 elastic means, first 4 and second 5, against corresponding surfaces, first 3a and second 3b, defined by the cylindrical body 3.

The stop means 40, 50 include respective nuts screwed to the threaded stem 2 in adjustable configurations.

With reference to Figures 2 and 5, it is possible to notice that, when in the rolled up configuration A, the  
5 elastic means, first 4 and second 5, are partially compressed, that is "pre-loaded", and partially released; while, when in the unrolled configuration B, the elastic means, first 4 and second 5, are respectively partially released, and partially compressed, that is "loaded".

10 As it will be explained better later on, the proposed friction device 100, allows easily to define the upper A\* stop point and the lower stop point B\*, of the curtain 1a, in relation to the maximum compression of elastic means, respectively first 4 and second 5.

15 In particular, the stop points, upper A\* and lower B\*, can be adjusted in relation to the adjustment of the nuts 40, 50, as well as in relation to the nature and/or dimensions of the elastic means 4, 5.

In this case, the maximum compression is intended as the  
20 maximum compression that can be applied without making the operation chain 1b slide inside the shaped groove of the pulley 17.

According to a preferred embodiment, the elastic means, first 4 and second 5, include respective series of  
25 elements, a first series 41 and a second series 51, of resilient material, fitted freely on the threaded stem 2, close to one another.

The resilient elements 41, 51 can be either spheroid, or ellipsoid blocks of resilient material, having a through  
30 hole along a diametrical axis and fitted freely on the threaded stem 2, close to one another.

The resilient material, of which the pluralities of elements 41, 51 are made, can be neoprene gum or any other kind of synthetic or natural gum.

5 The operation principle of the friction device 100 proposed by the invention, will be briefly described in the following, beginning from a rolled up configuration A of the curtain 1a (Figure 1).

10 With reference to Figure 2, it can be noted that in the rolled up configuration A, the first resilient elements 41, comprised between the first surface 3a of the cylindrical body 3 and the first nut 40, are partially compressed, in other words, they are pre-loaded in a predetermined way; while the second resilient elements 51, comprised between the second surface 3b of the  
15 cylindrical body 3 and the second nut 50, are partially released.

By acting suitably on the driving chain 1b, which engages with the shaped groove of the pulley 17, the curtain 1a is moved from the rolled up configuration A to the  
20 unrolled configuration B (Figures 1, 4), setting the roller 1 into rotation with respect to the support means 10.

Due to the action of the pair of opposite teeth 30 made in the cylindrical body 3, the movement of the roller 1  
25 drives also the cylindrical body 3 into rotation.

Contemporarily, the cylindrical body 3 translates axially with respect to the threaded stem 2, with which it is screw coupled.

During the curtain transition from rolled up  
30 configuration A to the unrolled configuration B, the cylindrical body 3 translates with respect to the



threaded stem 2, moving away from the first nut 40, that is moving closer to the second nut 50.

During the translation towards the second nut 50, the cylindrical body 3 is subjected to the friction action  
5 generated by the gradual release of the first elastic means 41, which have a fixed stop on the first nut 40, as well as to the friction action caused by gradual compression of the second elastic means 51, which have a fixed stop on the second nut 50.

10 Thus, the resistance action applied by the resulting friction acting on the cylindrical body 3, compensates for the weight effect of the curtain 1a, which constantly increases during unrolling, until the unrolled configuration B is reached (Figure 4).

15 With reference to Figure 5, it is to be noted that in the unrolled configuration B, the first resilient elements 41, previously "pre-loaded", are now partially released, while the second elastic means 51, previously released, are now partially compressed, that is they are under a  
20 predetermined "load".

The compression of the second elastic means 51, which have a fixed stop on the second nut 50, facilitates the subsequent transition of the curtain 1a from the unrolled configuration B to the rolled up configuration A,  
25 contrasting the weight effect of the curtain 1a, which decreases continuously during the rolling up, until the rolled up configuration A is reached (Figure 1).

During the transition of the curtain 1a from the unrolled configuration B to the rolled up configuration A, the  
30 cylindrical body 3 translates with respect to the threaded stem 2, moving far from the second nut 50, that is moving close to the first nut 40.

During the translation close to the first nut 40, the cylindrical body 3 is subjected to the friction action generated by the gradual release of the second elastic means 51, as well as to the friction action caused by the gradual compression of the first resilient elements 41.

Consequently, during the unrolling of the curtain 1a, the second elastic means 51 are gradually compressed and the first resilient elements 41 are gradually released, which results in a friction action, balancing the weight effect of the curtain 1a, which increases continuously, until the unrolled configuration B is reached.

On the contrary, during the rolling up of the curtain 1a, the first resilient elements 41 are gradually compressed and the second elastic means 51 are gradually released, which results in a friction action, balancing the weight effect of the curtain 1a, which decreases continuously, until the rolled up configuration A is reached.

What above, can be likewise applied to the case, in which the curtain 1a is moved between the corresponding stop points, upper A\* and lower B\* respectively.

In this case, by changing suitably the setting of the nuts 40, 50 and/or by suitable action during assemblage on the nature and/or dimensions of the plurality of resilient elements 41, 51, it is possible to adjust the stop points, upper A\* and lower B\* respectively.

Advantageously, the upper stop points A\* of the curtain 1a is defined at a point corresponding to the maximum compression of the first resilient elements 41, while the lower stop points B\* is defined at a point corresponding to the maximum compression of the second resilient elements 51.

As it has been anticipated, maximum compression means the maximum compression, which can be applied without making the operation chain 1b slide within the shaped groove of the pulley 17.

- 5 Thus, it is no doubt clear that the stop points A\*, B\* of the curtain 1a can be easily adjusted by acting on the setting of the nuts 40, 50.

According to interesting embodiments, the resilient elements 41, 51 of the relevant pluralities can have each  
10 one different diameters and/or different compression characteristics, due to the fact that they are made of resilient material of different hardness.

The resilient elements 41, 51 can also have a peripheral facing, which avoid interference with the inner surface  
15 of the roller 1, inside which they are housed.

It is understood that the number of the resilient elements 41, 51 of the plurality is variable and is a direct function of the dimensions, thus weight, of the rolling up curtain 1a.

- 20 In practice, what above allows to fit properly to a wide range of situations.

According to another embodiment, a reduction group 6 (indicated with a broken line in Figures 2 and 5) is aimed at driving the threaded stem 2 into rotation with  
25 respect to the roller 1, by angular displacements reduced with respect to the latter, during the curtain 1a movement.

Consequently, the proposed friction device for rolling up curtains and the like ensures best balancing thereof  
30 during their rolling up and unrolling, ensuring high stability in any intermediate position.

Therefore, it allows to operate rolling up curtains and the like by a substantially equilibrated action during the rolling up as well as unrolling, independently from the curtain type and dimensions.

- 5 The strength of the materials and duration in time of the characteristics of the elastic means, ensures high standards and reliability of the proposed friction device, as well as extreme noiselessness during any operation step.
- 10 Moreover, the proposed friction device ensures a best adjustment of the curtains stop points, during the curtain rolling up as well as unrolling, thus allowing simple and rapid assembling, as well as easy maintenance operations.
- 15 The possibility to adjust the curtain stop points by acting on the setting of the stop means and/or by acting during assemblage on the nature and/or dimensions of the pluralities of the resilient elements allows undeniable advantages.
- 20 Consequently, the proposed device not only does fulfill all the objects of the present invention, but it is also cheap in relation to the obtained results, structurally simple, reliable and functional as well.

CLAIMS

1. A friction device for rolling up curtains and the like, including:

5 a tubular roller (1), on which a curtain (1a) is wound;  
support means (10) for rotatably supporting said roller (1);

a threaded stem (2) supported inside said roller (1) in a way as to create an angular displacement of said roller  
10 with respect to said threaded stem during rotation of said roller;

the device being characterized in that it further includes:

an operative body (3), situated slidably inside the  
15 roller (1) and screw-fitted onto said stem (2), said operative body (3) being linked to said roller (2) in relation to rotation so as to move axially along said threaded stem (2) during the rotation of the roller due to unrolling and rolling up of said curtain (1a) from a  
20 rolled up configuration (A) to a unrolled configuration (B) and vice-versa;

first elastic means (4) and second elastic means (5) acting on said operating body (3) and in opposition to one another, so as to produce a variable friction effect  
25 on said operating body (3)

during motion of said curtain (1a) between said unrolled configuration (B) and rolled up configuration (A); and vice-versa, such that the curtain can be driven in a substantially balanced way during rolling up and/or  
30 unrolling;

first stop means (40) and second stop means (50) fastened to said threaded stem (2), and aimed at pressing respectively said first elastic means (4) and second elastic means (5), against corresponding first surface (3a) and second surface (3b) of said operating body (3).

2. A device according to claim 1, characterized in that in said rolled up configuration (A), said first elastic means (4) are at least partially compressed and second elastic means (5) are at least partially released, while in said unrolled configuration (B), said first elastic means (4) are at least partially released and second elastic means (5) are at least partially compressed.

3. A device according to claim 2, wherein at least one upper stop points (A\*) of said curtain (1a) is defined at which said first elastic means (4) reach such a compression degree that said operative body is prevented from further moving towards said first elastic means.

4. A device according to claim 2 or 3, characterized in that at least one lower stop points (B\*) of said curtain (1a) is defined at which said second elastic means (5) reach such a compression degree that said operative body is prevented from further moving towards said second elastic means.

5. A device according to claim 4, characterized in that said upper stop point (A\*) and lower stop point (B\*) of the curtain (1a) can be adjusted in relation to said first stop means (40) and second stop means (50).

6. A device according to one of the claims from 4 to 5,  
characterized in that said upper stop point (A\*) and  
lower stop point (B\*) of said curtain (1a) can be  
5 adjusted in relation to the dimensions and/or the nature  
of said first elastic means (4) and second elastic means  
(5).

7. A device according to one of the claims from 1 to 6,  
10 characterized in that said threaded stem (2) is supported  
in stationary configuration by said support means (10)  
such as to allow said roller (1) to rotate with respect  
to the threaded stem (2) during unrolling and/or rolling  
up of said curtain (1a).

15

8. A device according to one of the claims from 1 to 6,  
further including a speed reduction group (6), aimed at  
driving said threaded stem (2) into rotation with respect  
to said roller (1), by angular displacements reduced with  
20 respect to the latter, during unrolling and rolling up of  
said curtain (1a).

9. A device according to one of the previous claims,  
characterized in that said operative body (3) is a  
25 cylinder, which features said first surface (3a) and  
second surface (3b) and which has means for prismatic  
coupling with the roller (1).

10. A device according to claim 9, characterized in that  
30 said means for prismatic coupling include at least one  
tooth (30) made on said cylinder (3) and guided in a

corresponding inner longitudinal groove made in the roller.

11. A device according to claim 9 or 10, characterized in  
5 that said means for prismatic coupling include a pair of  
teeth (30) made on said cylinder (3) in diametrically  
opposite positions and guided in corresponding inner  
longitudinal grooves made in the roller (1).

10 12. A device according to one of the previous claims,  
characterized in that said first stop means (40) and  
second stop means (50) include respective nuts screwed to  
said threaded stem (2).

15 13. A device according to one of the previous claims,  
characterized in that said first elastic means (4) and  
second elastic means (5) of resilient material, are  
freely fitted on said threaded stem (2), close to one  
another.

20

14. A device according to claim 13, characterized in that  
said first elastic means (41) and second elastic means  
(51) are either spheroid or ellipsoid blocks and are made  
of resilient material, having holes along a diametrical  
25 axis, through which said threaded stem (2) passes.

15. A device according to claim 13 or 14, characterized  
in that said resilient material is neoprene gum or any  
other kind of synthetic or natural material.

30



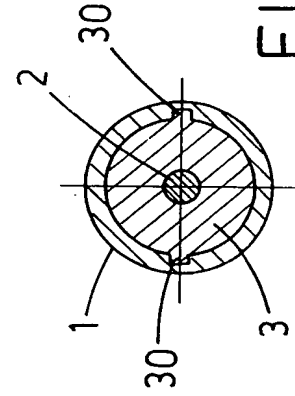
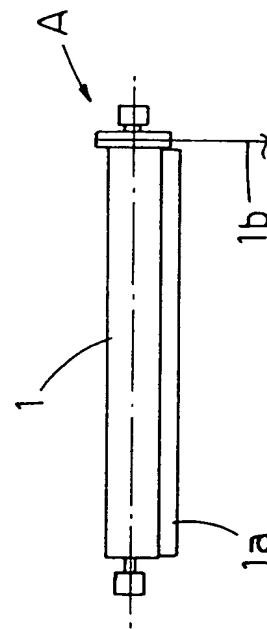
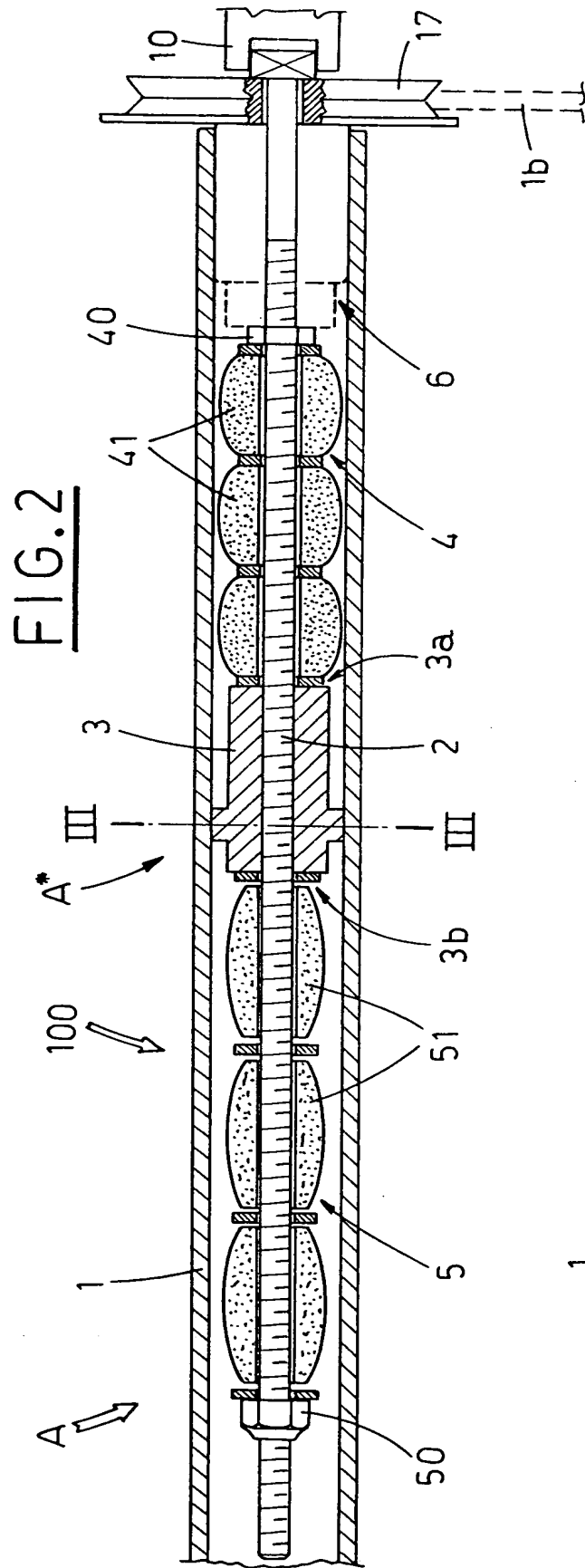
16. A device, according to any of the claims from 13 o  
15, characterized in that each of first elastic means  
(41) and second elastic means (51) have different  
compression characteristics, due to the resilient  
5 material of different hardness.

17. A device according to any of the claims from 13 to  
16, characterized in that each of said first elastic  
means (41) and second elastic means (51) have  
10 corresponding peripheral facings, which avoid  
interference with the inner surface of the roller (1).

18. A device according to any of the claims from 13 o 17,  
characterized in that each of said first elastic means  
15 (41) and second elastic means (51) have different  
diameter.

**ABSTRACT**

A friction device for rolling up curtains and the like includes a tubular roller (1), on which a curtain (1a) is wound. The roller (1) is rotatably carried by a support (10) and a threaded stem (2) is situated axially inside the roller (1) and carries, mounted thereon by a screw coupling, an operative body (3), likewise situated inside the roller (1). The operative body (3) translates axially with respect to the threaded stem (2) during motion of the curtain (1a) from a rolled up configuration (A) to a unrolled configuration (B). Elastic blocks (41, 51) push on the operating body (3) to produce a friction effect on the operating body and transmitted to roller (1) during curtain (1a) transition between the unrolled and rolled up configurations, thus allowing operation of the curtain in a substantially balanced way during rolling up and/or unrolling. Stop nuts (40, 50) are fastened to the threaded stem (2) for compressing the elastic blocks against surfaces of the operating body (3).



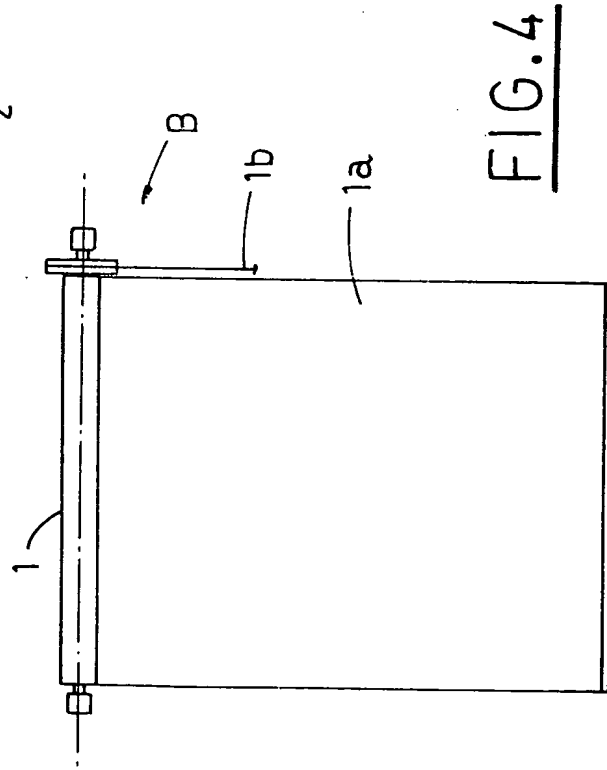


FIG. 4

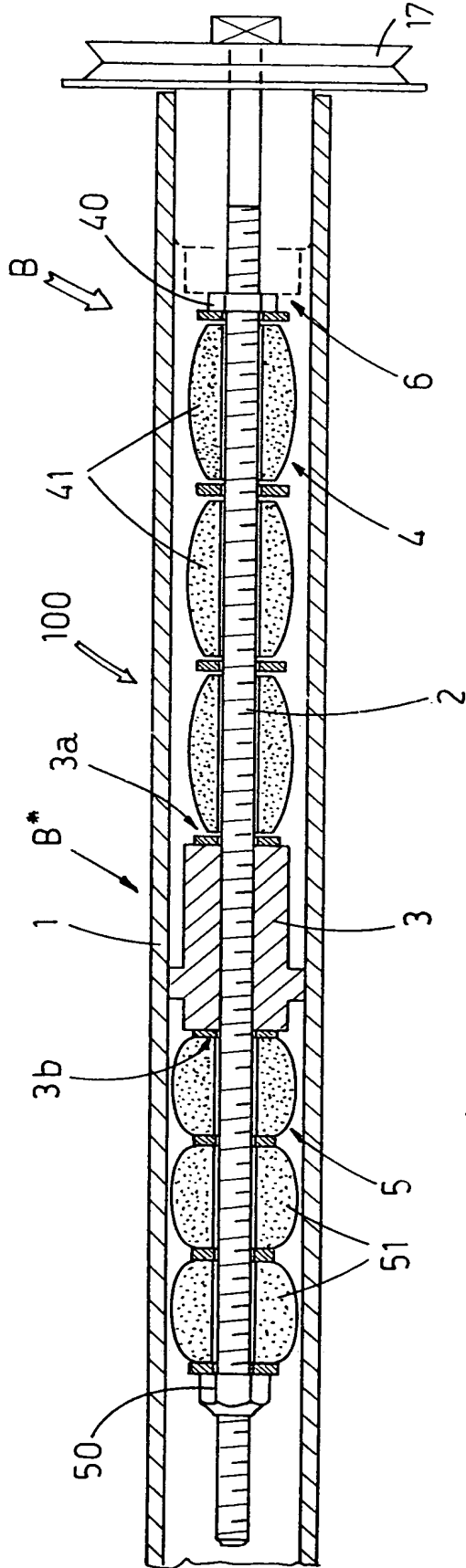


FIG. 5